شبكة المعلومات الجامعية

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بسم الله الرحمن الرحيم

HANAA ALY

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HANAA ALY

EXPERIMENTAL AND NUMERICAL INVESTIGATION OF HIGH-SPEED ROTORS IN NOVEL FLUID FILM BEARINGS

By

Mohamed Samir Mohamed Ibrahim

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Mechanical Design and Production Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

EXPERIMENTAL AND NUMERICAL INVESTIGATION OF HIGH-SPEED ROTORS IN NOVEL FLUID FILM BEARINGS.

Key Words:

Fluid Film Bearings; High-Speed Rotor; Misalignment; Rotordynamics; Turbocharger

Summary:

The present work numerically and experimentally investigates the impact of bearing misalignment on the rotor-bearing system instability. Mathematical models for all novel misaligned bearings are well elaborated. These models are then numerically solved using a finite element C++ bearings program. When simulations are performed, oil pressure and film thickness distribution are plotted and discussed for these bearings. Consequently, different rotors supported on these novel bearings are numerically tested using a finite element C++ rotordynamics program. Misaligned bearings are then designed and manufactured according to the simulations results. These novel bearings are further tested on a 60k rotating shaft test rig. Upon testing these bearings, the oil whip instability threshold is considerably postponed. These results are motive to introduce misaligned bearings in the automotive turbochargers industry.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mohamed Samir Mohamed Ibrahim Date: .. /.. /2021

Signature:

Dedication

In memory of my father, and to my mother- my greatest supporter- with love and deep appreciation.

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